

# CARBON DIOXIDE

Also known as: Carbonic acid gas; Dry Ice; CO<sub>2</sub>; Diesel Exhaust Component  
Chemical reference number (CAS): 124-38-9

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## WHAT IS CARBON DIOXIDE?

At room temperature, carbon dioxide (CO<sub>2</sub>) is a colorless, odorless, faintly acidic-tasting, non-flammable gas. CO<sub>2</sub> is the fourth most abundant gas in the earth's atmosphere. Depending on the temperature and pressure, carbon dioxide can also exist as a liquid or a solid. In its solid form, carbon dioxide is called dry ice.

## WHERE IS CARBON DIOXIDE FOUND IN THE ENVIRONMENT?

CO<sub>2</sub> is a byproduct of normal cell function. It is removed from the body via the lungs in the exhaled air. CO<sub>2</sub> is also produced when fossil fuels are burned. Decaying vegetation can also produce CO<sub>2</sub>. Surface soils can sometimes contain high concentrations of this gas, from decaying vegetation or chemical changes in the bedrock. In its solid form, CO<sub>2</sub> is used in fire extinguishers and in theater and stage productions as dry ice to make fog.

## HOW ARE PEOPLE EXPOSED TO CARBON DIOXIDE?

CO<sub>2</sub> can build up in buildings that house a lot of people or animals, and is a symptom of problems with fresh air circulation in the building or home. Where CO<sub>2</sub> levels in soils are high, the gas can seep into basements through stone walls or cracks in floors and foundations. High levels of CO<sub>2</sub> can displace oxygen (O<sub>2</sub>) and nitrogen (N<sub>2</sub>), potentially causing health problems.

## WHAT CONDITIONS LEAD TO HIGH CARBON DIOXIDE LEVELS INDOORS?

The amount of carbon dioxide in a building is usually related to how much fresh air is being brought into that building. In general, the higher the CO<sub>2</sub> level in the building, the lower the amount of fresh air exchange. Therefore, examining levels of CO<sub>2</sub> in indoor air can reveal if the heating, ventilation, and air conditioning (HVAC) systems are operating within guidelines. CO<sub>2</sub> levels are usually measured in percent (%) of air or parts per million (ppm). High CO<sub>2</sub> levels, generally over 1000 ppm, indicate a potential problem with air circulation and fresh air in a room or building. In general, high CO<sub>2</sub> levels indicate the need to examine the HVAC system. High carbon dioxide levels can cause poor air quality and can even extinguish pilot lights on gas-powered appliances.

## WILL EXPOSURE TO CARBON DIOXIDE RESULT IN HARMFUL HEALTH EFFECTS?

Exposure to CO<sub>2</sub> can produce a variety of health effects. These may include headaches, dizziness, restlessness, a tingling or pins or needles feeling, difficulty

breathing, sweating, tiredness, increased heart rate, elevated blood pressure, coma, asphyxia to convulsions and even frostbite if exposed to dry ice.

The levels of CO<sub>2</sub> in the air and potential health problems are:

- 250 - 350 ppm – background (normal) outdoor air level
- 350- 1,000 ppm - typical level found in occupied spaces with good air exchange.
- 1,000 – 2,000 ppm - level associated with complaints of drowsiness and poor air.
- 2,000 – 5,000 ppm – level associated with headaches, sleepiness, and stagnant, stale, stuffy air. Poor concentration, loss of attention, increased heart rate and slight nausea may also be present.
- >5,000 ppm – Exposure may lead to serious oxygen deprivation resulting in permanent brain damage, coma and even death.

## HOW TO AVOID EXPSOURE

- Have an HVAC or weatherization contractor measure CO<sub>2</sub> levels within your home. If the levels exceed 1,000 ppm, the furnace should be tuned to increase levels of fresh air coming into the building. If levels are above 2,000 ppm, this can be a serious condition that could warrant HVAC modification.
- Never use a fire extinguisher or dry ice in a manner by which it was not intended.
- Never enter a liquid manure pit without protective equipment since CO<sub>2</sub>, along with ammonia, methane and hydrogen sulfide generated from decomposing manure can quickly cause loss of consciousness and death.
- Use care when entering silos since CO<sub>2</sub> can build up from the decomposing grain.

## FOR MORE INFORMATION

- Contact your [local health department](#) or the Wisconsin Division of Public Health, Bureau of Environmental and Occupational Health, 1 West Wilson St, Room 150, Madison, WI 53702, Phone: (608) 266-1120, Fax: (608) 267-4853.
- CDC websites on carbon dioxide:  
<http://www.cdc.gov/niosh/pdfs/iaq.pdf>  
<http://www.cdc.gov/niosh/pdfs/76-194a.pdf>  
<http://www.cdc.gov/niosh/pdfs/76-194b.pdf>  
<http://www.cdc.gov/nasd/docs/d001701-d001800/d001708/d001708.html>  
<http://www.cdc.gov/nasd/docs/d001701-d001800/d001741/d001741.html>
- Poison Control Center: 1-800-222-1222



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